MONETARY TENSIONS AND FACTORS GENERATING THEM

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Abstract: *The paper begins with some conceptual delimitations and with outlining the theoretical framework on the topic approached starting from the concept of monetary tension, but also modalities of expression and possibilities of identification or evaluation of such tensions, by reporting to some specific indicators that, through their meanings and evolution, can either reflect the presence of tensions, or to represent generators of them. To a great extent, however, the paper focuses on econometric analyzes of the presence of some monetary tensions and of the impact factors under the concrete conditions in Romania, in 2008-2013, by building and applying two models in which the indicators M2 monetary aggregate and the interbank interest rate are considered dependent variables, expressing the presence of certain monetary tensions while GDP, the total bank loans, the non-performing bank loans, the interest rate on bank loans, etc., appear as factors generating tensions and as determinant variables.*
Keywords: *M2 monetary aggregate, ROBOR ON, GDP, interest rate, non-performing loans, total loans*

INTRODUCTION

The notion of "tension" emerged and is used primarily in the medical field, but is also used in other areas of human life and activity, being given to it connotations related to the "state of health" or to the less performing way of functioning of the various components of living organisms, including systems, processes, social relationships etc.

On a broader plan, it is recognized also the need for the existence of some "tensions" whose values can vary within normal limits such is, in medicine, the case of blood pressure that characterize situations of normal functioning of living organisms and, implicitly, of maintaining the state of health. In contrast, especially in other areas, most often, references to "tensions" aim exactly the exits from the normal state, presuming values outside the acceptable limits, suggesting possible malfunctions and the perspective of producing phenomena or events with negative consequences, perceived as specific risks.

In the same context, the economic area and literature, taking and adapting various terms that come from other areas appeal more often lately to phrases like "states of tension" or "financial stress", which characterize economic and financial phenomena marked by the emergence of some malfunctions or unbalancing trends, for example, on the financial and monetary markets etc.

At the same time, it has to be admitted also the idea that the very functionality of the economy, as macro system, depends on the health and the way of functioning of each structural component, which can be perceived as an internal organ of this system. Therefore, the possible disruptions in the functioning of some components, including those with financial-monetary substance, can cause the overall alteration of the

economy's functioning, including a contamination of the other components, which would lead to worsening the disruptions, meaning "illness "or even blocking of the entire economy, as a state similar to coma for the living organisms.

From the same perspective, the recent economic and financial crisis has reconfirmed the idea that shocks in the financial-monetary area can have significant effects on the real economy and that the instability in the financial-monetary field causes the manifestation of some systemic risks (Kliesen, Owyang and Vermann, 2012, p .369). Moreover, it appears that financial-monetary stress episodes characterized by imbalances in bank lending activity are strongly associated with sharp declines in the economy, than the other episodes of stress related financial-monetary markets. Also, the periods of recession corresponding to the financial stress generated by banking activity tend to last more than double than those not preceded by this type of financial stress (Cardarelli, Elekdag & Lall, 2009, p.6). As a consequence, the identification of possible monetary tensions and the analysis of their manifestation, namely of the factors that determine them may lead to interesting findings and conclusions with possible generalized character.

THEORETICAL APPROACHES

The presence of some major malfunctions which signifies certain tensions similar to "illnesses" in the sphere of monetary and financial processes is preceded, as in the case of living organisms, by the occurrence of some specific symptoms, whose correct identification and interpretation would allow actions to stop damage, to correct abnormal situations or to prevent the occurrence of others, which presumes promoting of policies appropriate for the concrete conditions in which the monetary and credit market evolve, at a time or another.

The premises of such an approach derive from the fact that, nowadays, in most advanced economies, but also in developing ones, including in Romania's case, monetary policy is designed and implemented by independent central banks, aiming to ensure primarily the price stability on the background of the evolution of economy as a whole (Zurbrugg, 2012, p.3). But decisions related to such policies, having as main target the limitation of the future evolution of inflation (Kydland and Prescott, 1977; Barro and Gordon, 1983) are under the incidence of some competing pressures as they must ensure, on the one hand, price stability and, on the other hand, maintaining economic growth and reducing unemployment (Copelovitch & Singer, 2008, p.667). Likewise, the academician Isarescu showed that, even it is unanimous recognized the need to ensure economic growth but also a low inflation, in the short term there is a certain tension between the objective of low inflation and the one of stimulating growth, because on such a horizon the monetary policy influences the real economic variables (Isărescu, 2013, p.9).

Also, the scientific literature emphasizes the idea that, generally, the central bank focuses its monetary policy towards adjusting the supply of money or the levels of monetary aggregates (Keister, Martin & McAndrews, 2008, p.41), making use of its tools, seen as powers conferred on the system to determine the existing volume of money or to change it (Friedman, 1959, p.24). Therefore, when monetary policy is credible and

manages to ensure price stability, the expectations regarding inflation are at low levels and are well anchored (Zurbrugg, 2012, p.4).

On the other hand, some authors find monetary tensions generated also by the fact that cyclical effects of monetary policy are not consistent with those of the regulations of the banking activity, primarily, of the lending one, the two approaches having quite opposite orientations. Thus, monetary policy tends to behave countercyclical, while banking regulation acts procyclically, causing a contraction of the banking activity in periods of recession (Goodhart & Shoenmaker, 1993). In this regard, it is noted that, usually, in case of an economic downturn or a recession, central banks react by expanding the money supply to spur the economic recovery. But in the same period, the same central banks, as supervisory and regulatory authorities, ask, usually, commercial banks to increase their reserves and to improve the quality of their loan portfolio, leading to a restriction of credit, and thus of financing of economic agents, although they should facilitate the financing of investment and consumption (Copelovitch & Singer, 2008, p.667). Furthermore, there are outlined two types of tendencies, with confusing character, from the lenders and investors, namely, one to underestimate the risk in periods of boom and one to overestimate it in times of economic downturn (Berger & Udell, 2004). According to the first tendency, they are inclined to ignore the possibility of obtaining losses, taking risks that generate non-performing loans (Hakkio & Keeton, 2009, p.10) and hence monetary financial tensions associated to them. The second tendency is present in the conditions of economic recession, when lenders and investors overestimate risks, which leads to lower investment and income generating activities etc., including to the emergence or worsening of other tensions in the money market.

In relation to the above, it appears to us of real interest the observation that, to a great extent, manifesting of monetary tensions organically intertwines with the bank lending activities, including with the quality of loan portfolios of commercial banks, these being retrieved in the imbalances that appear on monetary and credit markets, but also in the levels of specific indicators determined at the macro level. Under the latter aspect, we associate also to the idea expressed by some researchers (Wong et al, 2007; Yiu et al, 2009), which consider that by the content and the evolution of their levels, some indicators may reflect the presence of monetary tensions, but they can appear also as factors that generate such effects, as inflation, etc.

At the same time, it is worth mentioning that along with factors that express the state of the real economy, out of which is distinguished, in the foreground, GDP, it is growingly invoked, lately, as a driver of tension, the deterioration of the quality of bank loan portfolios and particularly increasing of the share of non-performing loans (Von Hagen & Ho, 2004; Filip, 2014). This involves the accumulation of a growing volume of bad loans, which reduces liquidity at the commercial banks' level, necessitating recourse to central bank credit for new resources, which may lead to an excessive money supply, and so to tensions in the money and credit market.

In the same context, marked also by the globalization of the last financial crisis, it appears that, since its onset, in most countries of the world, both the volume and the share of nonperforming loans (NPLs) showed continuous growth trends, leading in different,

but significant, proportions to imbalances, respectively tensions in financial-monetary area.

In relation to the above mentions, we appreciate that, in principle, become necessary knowing and monitoring the presence and amplitudes of monetary tensions, which can be identified and evaluated by observing the levels and dynamics of some benchmarks of them, such as those relating to money supply and, mainly, the dynamics and changes in M2 monetary aggregate, or to short-term interbank interest rate, but also to the inflation rate or exchange rate etc. Simultaneously, it is necessary to identify the determinants and to analyse their impact on the level and variance of each indicator of this type, which reflects the presence or amplitude of monetary tensions, starting from causal links typical for the involved variables and processing the data corresponding for specific situations of time and space.

From the same perspective, we believe to be revealing deepening the analyses on the manifestation of monetary tensions, both in terms of M2, and in that of the interbank interest rate. In this respect, it is acknowledged that by its content and dimensions, M2 monetary aggregate highlights potential monetary tensions, especially through the sharp changes of its values registered in specific periods. Moreover, reporting its dynamics to that of the real GDP provides findings of real interest for the elaboration of monetary policies. In turn, a distinctive analysis of these variations based on the specific causal links can highlight factors generating monetary tensions represented by indicators such as: the change in total bank loans; the NPLs volumes; GDP; the interest rate on bank loans.

In a similar manner, the approach of the analysis on the presence and magnitude of monetary tensions, highlighted through the interbank interest rate, should be based on its level and causal links with determining factors of specific tensions.

In principle, the level of the interest rate on the interbank market evolves depending on the ratio between supply and demand for credit of the commercial banks participating in such transactions. But, it is acknowledged that any disruptions or blockages of monetary resources, on the levels of commercial banks or the banking system as a whole, can produce shocks in their workflows, generating major increase of the interest charged on the market, meaning monetary tensions. Causes that can lead to such tensions are various and, implicitly, there can be identified several impact factors or determining variables of the level of the interest rate on the interbank market, among which are: the change of total bank credit; the change in the interest rate on bank loans; the relative change in non-performing bank loans; M2 size etc. Thus, the growth of bank loans coupled with the monetary policy to reduce interest rates and increase liquidity promoted by the central bank and with a possible increase in NPL's share in a given period, usually results in an increase of the interest rates on the interbank market. If we assume, however, the reverse changes of the previously cited determining variables, their impact on the interest rate in the interbank market would be reflected in a reduction of the latter. In both cases, changes of the interbank interest rate in higher dimensions, compared to the accepted normal, would signify the presence or amplification of monetary tensions.

DATA ANALYSIS AND RESULTS

Our econometric analysis begins with assessing of causality linkages between the dynamics of M2, on the one hand, that we conceive as dependent variable, and GDP, the change in total bank loans (ΔTL), the volume of non-performing bank loans (NPL) and the interest rate on bank loans (LIR), on the other hand, considered as determinant variables. Thus, using quarterly statistical information for the period 2008-2013, and processing them using Pearson correlation led to the results presented in Table 1:

Table 1 The Correlation Matrix

Covariance Analysis: Ordinary					
Sample: 2007Q4 2013Q4					
Correlation					
Probability	M2	GDP	NPL	ΔTL	LIR
M2	1.000000				

GDP	0.559144***	1.000000			
	0.0037	-----			
NPL	0.972248***	0.510601***	1.000000		
	0.0000	0.0091	-----		
ΔTL	0.714983***	0.322288	0.613781***	1.000000	
	0.0001	0.1161	0.0011	-----	
LIR	-0.707974***	-0.471392**	-0.815939***	-0.240885	1.000000
	0.0001	0.0174	0.0000	0.2461	-----

***, **, * - denotes significance at 1%, 5% and 10%, respectively

As expected, according to the data in Table 1, emerged significant positive correlations between M2 and GDP dynamics, respectively the change in total bank loans and a significant reverse correlation of M2 with the interest rate on bank loans.

Particularly, data from the same table 1, reveals that during the period under analysis, between M2 and the volume of NPLs there was a highly significant positive correlation, highlighted, both by the correlation coefficient (0.972248) and by the threshold of statistical probability of less than 1%. Moreover, the fact that these correlations have a significance level below 1%, entitles us to consider possible expressing the determination relationships of the dependent variable (M2) by those determining variables, through an OLS regression model that can be played in the following form:

$$M2 = \beta_0 + \beta_1 PIB + \beta_2 CRNP + \beta_3 \Delta CRT + \beta_4 RDCR + \varepsilon \tag{1}$$

By testing the proposed regression model, using the data set for the analysed period, for Romania, were obtained the results summarized in Table 2:

Table 2 Results of applying the regression equation regarding M2 in Romania's case

Dependent Variable: M2		
Method: Least Squares		

Sample: 2007Q4 2013Q4				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP	0.087298	0.033159	2.632687	0.0160
NPL	1.775699	0.144290	12.30642	0.0000
ΔTL	0.362065	0.158072	2.290512	0.0330
LIR	1.903723	0.688509	2.764994	0.0119
β_0	118.2085	13.64183	8.665149	0.0000
R-squared	0.980275	Mean dependent var		196.0982
Adjusted R-squared	0.976330	S.D. dependent var		25.35417
S.E. of regression	3.900770	Akaike info criterion		5.737082
Sum squared resid	304.3202	Schwarz criterion		5.980857
Log likelihood	-66.71352	Hannan-Quinn criter.		5.804695
F-statistic	248.4832	Durbin-Watson stat		1.650809
Prob (F-statistic)	0.000000			

The results in table 2 reveal, in the foreground, a very high degree of viability of the proposed regression equation (R-squared = 0.9803; Adjusted R-squared = 0.9763), which confirms that the size of M2 changes especially under the impact of the mutations on GDP, on the volume of NPLs and on the other variables included in equation (1).

From the processing of the data, have resulted also significant relationships of positive determination of M2 by the dynamics of the quarterly GDP and by the changes in the total volume of bank loans, for these variables being recorded probabilities significantly below the 5% threshold.

The same results, attest also the fact that the volume of nonperforming loans significantly influences the dynamics of M2, as confirmed by the resulted very high probability (Prob. = 0.0000). Therefore, we can say that an increase in non-performing loans is likely to create additional pressure in the money market and lead ultimately to an excessive increase in the size of M2, generating certain monetary tensions.

Also the interest rate on bank loans appears too to have a significant positive influence (Prob. = 0.0119) on the evolution of M2, given its interaction with other determinants, although the strict correlation between these two variables resulted before to be negative.

On the other hand, an econometric analysis regarding the manifestation of monetary tensions, considering as dependent variable the overnight interest rate on interbank loans (ROBOR_ON), we propose as determinant variables: the quarterly relative change in nonperforming loans (ΔNPLR); the volume of M2; the quarterly change in the interest rate on bank loans (ΔLIR) and the quarterly change of total bank loans (ΔTL). Such an analysis is based on processing of statistical data related to these variables for the period 2008-2013 in the case of Romania, based on the evaluation of the related correlations and the results are presented in Table 3.

Table 3 The Correlation Matrix

Covariance Analysis: Ordinary					
Sample: 2007Q4 2013Q4					
Correlation					
Probability	ROBOR_ON	ΔNPLR	M2	ΔLIR	ΔTL

ROBOR_ON	1.000000				
ΔNPLR	0.575942***	1.000000			
	0.0026	-----			
M2	-0.704903***	-0.326054	1.000000		
	0.0001	0.1117	-----		
ΔLIR	0.754143***	0.187727	-0.406160**	1.000000	
	0.0000	0.3689	0.0439	-----	
ΔTL	-0.387554*	-0.129361	0.714983***	-0.249476	1.000000
	0.0556	0.5377	0.0001	0.2291	-----

***, **, * - denotes significance at 1%, 5% and 10%, respectively

The results express the existence of a significant and positive correlation between the quarterly relative change in nonperforming loans and the overnight interest rate on interbank loans indicator (Prob. = 0.0026), the correlation coefficient having also a high value (0.575942). This highlights the fact that along with the increase of non-performing loans, we are witnessing a price increase of interbank lending, which is explainable by the fact that banks are forced to create additional provisions, reducing their supply of financial resources available to be lend to banks with deficits, which, in relation to the higher demand, leads to higher rate of interest on these loans.

At the same time, the rise of the interest rates on loans to customers has too a significant impact of growth on the overnight interest rate on interbank loans, provided that the lending banks expect yields from lending to other banks on similar levels to those granted to non-bank customers.

On the other hand, we note the existence of significant reverse correlations between the overnight interest rate on interbank loans and M2 (Prob. = 0.0026) and total bank loans variation (Prob. = 0.0556). These results can be interpreted as meaning that an increase in M2 creates conditions for the existence of a surplus of resources available at the level of the commercial banks, increasing the supply of credit and, under these circumstances, reducing the cost (represented by interest) of interbank loans.

In its turn, the change in the volume of total loans granted by banks, can have both a positive effect and a negative one on the interbank interest rate, whose major fluctuations indicate the presence of some monetary tensions.

The significant correlations between the overnight interest rate on interbank loans and the other variables mentioned above, identified according to Table No. 3, provide the necessary support to build a regression model where the dependent variable is ROBOR_ON, and the other variables are determinants, which we present in the form of the following equation:

$$ROBOR\_ON = \beta_0 + \beta_1 \Delta CRNPR + \beta_2 M2 + \beta_3 \Delta RDCR + \beta_4 \Delta CRT + \varepsilon \tag{2}$$

Further, processing the data for the period 2008-2013, in Romania's case, by applying the proposed regression equation (2), led to the results in Table 4:

Table 4 Results of applying the regression equation regarding ROBOR_ON in Romania's case

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Dependent Variable: ROBOR_ON				
Method: Least Squares				
Sample: 2007Q4 2013Q4				
ΔNPLR	0.080735	0.019912	4.054639	0.0006
M2	-0.064526	0.017315	-3.726631	0.0013
ΔLIR	2.415054	0.390198	6.189305	0.0000
ΔTL	0.054841	0.051233	1.070406	0.2972
β_0	18.60611	3.567581	5.215329	0.0000
R-squared	0.877589	Mean dependent var		6.401200
Adjusted R-squared	0.853106	S.D. dependent var		3.519693
S.E. of regression	1.348982	Akaike info criterion		3.613434
Sum squared resid	36.39504	Schwarz criterion		3.857209
Log likelihood	-40.16792	Hannan-Quinn criter.		3.681047
F-statistic	35.84590	Durbin-Watson stat		1.853212
Prob (F-statistic)	0.000000			

The values shown in table 4, indicate that the evolution of the overnight interest rate on interbank loans is determined in a very high proportion (R-squared of 0.8776, Adjusted R-squared of 0.8531) by the determinant variables included in the developed econometric model, which confirms the relevance of this model.

Moreover, the results in the table highlight the significant dependence of the overnight interest rate on interbank loans by the relative variation of non-performing loans and by the variation of the interest rate on bank loans, the changes in the two variables determining changes in the same direction of the dependent variable. We also note that both determining variables present values of probability below a level of statistical significance of 1%, which leads to rejection of the null hypothesis for the value of their coefficients and confirms the reliable dependence of the dependent variable by the action of these factors. By default, the values obtained, prove that, in the analysed period, the increase in volume of non-performing bank loans caused a pressure in the money market for rising the interbank interest rate.

Simultaneously, we find that there is a significant dependency (Prob = 0.0013), but reversal, of the levels of the dependent variable by the dynamics of M2, and in the case of the change in the volume of total bank loans, the probability value leads to the conclusion that it is less significantly influencing the dependent variable. However, through the resulting coefficient (Coef = 0.054841) it is found that the variation of the volume of total bank loans causes an evolution in the same direction of the variable determined.

CONCLUSIONS

The undertaken research emphasizes, firstly, the necessity of approaching the monetary tensions and generally of those related to economic and financial domain, in a similar way to those specific for the living organisms, to whom it is associated also the functioning of the economy, with all its components, including the money markets, where

may occur states of "tensions" or "financial stress". From this perspective, the presence of some major malfunctions or disorders of the monetary flows, including of those related to bank credit, means the existence of some tensions similar to "illness" of living organisms. As result, identifying these tensions and of their generating factors, through analyzes, and applying of appropriate monetary and credit policies, become indispensable to counter certain possible shocks on the financial-monetary plan, with disruptive effects on the real economy, as in the recent global crisis.

In the same context our research highlights the possibilities of identification and analysis of both of the presence and intensity of any monetary tensions and of some the factors generating them, by reporting to the levels and dynamics in time and space, recorded by some indicators specific to this domain, based on their content and characteristic causal links. Thus, we believe that indicators such as M2 monetary aggregate, interbank interest rate, etc. reflect also the presence of some monetary tensions, although in other circumstances they can become generating factors of other manifestations of tensions of monetary kind. Correspondingly, other indicators (GDP, nonperforming bank loans, interest rates on bank loans, etc.) appear in positions of generating factors.

Developing research through econometric analyzes, on the presence of monetary tensions and their determinants, focusing on the case of Romania, in the period 2008-2013, incorporates several steps. These include the building and the application of two econometric models, in which the M2 monetary aggregate and interbank interest rate are dependent variables while GDP, nonperforming bank loans, total bank loans, the interest rate on these loans and even M2 (in the second model) are determinant variables and the corresponding data processing confirmed a high degree of viability for both models.

Also, the analysis centred on the evolution of M2 monetary aggregate, certifies the manifestation of monetary tensions and highlights its significant dependence by the dynamics of GDP, and especially those of the volume of non-performing bank loans and interest rates on bank loans but also by the total bank loans variation. On the other hand, the analysis of the dynamics of short-term interbank interest rate, whose variations confirm the existence of certain monetary tensions, shows its significant, but reversely, dependency by the dynamics of M2 monetary aggregate. Moreover, the results confirm that the respective dependent variable evolves correlated and in close dependency with variations in interest rates on bank loans and the volume of non-performing bank loans, which appear as factors generating monetary tensions.

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